RSD-58

Swiss Armed Forces and Japanese Defense Agency (also see the MTG missiles, manufactured in Italy).

Type: Surface-to-air weapon system developed as a private venture. Drawing: p. 891.

DURING the past decade, Contraves A.G. together with the Armament Division of the Oerlikon Machine Tool Works (Bührle and Company), both of Zurich, have been assiduously developing this weapon system as a private venture, and it is now offered for sale "over the counter." Extensive trial firings were carried out in Switzerland and France in 1950 and 1951, and early in 1952 the U.S. Air Force evaluated 25 of the Type 51 missiles at Holloman A.F.B.

The standard anti-aircraft missile this year is the RSD-58. The finely streamlined body is made from wrapped tubing and sheet with Araldite bonding, and the delta wings are of sandwich construction. Propulsion is provided by a 2,200 lb-thrust nitric acid/kerosine sustainer (no booster is used) and the missile is controlled by a cruciform of tail fins (and, during the launching, by deflection of the motor chamber).

Missiles are fired at any elevation from 10 deg to 90 deg from a twin launcher, which may be mounted on a mobile chassis. After gathering in a wide radar beam, the missile is centred in a fine guiding beam and rides this until the proximity fuze detonates the 88-lb warhead. A complete tactical battery comprises a command post, radar tracker, beam transmitter, six twin launchers and the necessary power-supply units. The sustained battery rate of fire can reach twelve rounds per minute, i.e. two rounds per minute for each twin launcher.

For training purposes, the RSC-57 is almost identical to the operational missile, except for the fact that the warhead is replaced by a parachute recovery system, and the quantity of propellants is reduced so that the range and burn-out speed are roughly one-third as great as in the RSD-58. The RSC-57 is in service as a training missile with the Italian Air Force and has also been delivered to the Japanese Defense Agency, together with a complete school battery for test, evaluation and training purposes.

RSD-58: length, 19ft 8in; wing span, 53in; body diameter, 15.7in; firing weight, 882 lb; burn-out speed, Mach 2.4; maximum controllable altitude, 65,600 ft; maximum controllable slant range, 33,000 yd (18.6 miles).

RUSSIAN A.A. MISSILE

Believed to be in service with Soviet Army and Air Force; the weapon is unofficially reported to be designated M-2.

Type: Radar-guided, surface-to-air missile for operation from fixed and mobile bases. Drawing: p. 890.

NO further information has become available since this missile was first seen in the Red Square parade in November 1957. All that could reasonably be deduced was published in our last missile review. Of "British" configuration, with cruciforms of wings and rear-mounted control fins, this missile is launched by a tandem boost motor and appears to have beam-rider or command guidance. The nose is not a radome, but it carries four blade arials.

Russian A.A.: length, approximately 21ft (30ft with booster); body diameter, about 18in; wing span, approximately 69in; firing weight, about 1,500 lb (about 2,500 lb with booster); burn-out speed, probably about Mach 2; maximum slant range, probably about 20 miles.

SEASLUG

Royal Navy.

Type: Radar-guided surface-to-air weapon for use from surface vessels. Drawing: p. 891.

THE first relatively complete account of the development of the Seaslug weapon system was published in our issue of November 21 of this year. Its development has been the responsibility of three chief contractors: Armstrong Whitworth Aircraft for the airframe, and for several other portions of the weapon system, as well as flight testing; G.E.C. for the guidance system (which incorporates packaged units housed in pressurized and air-conditioned boxes); and Sperry for the control system. The latter includes a control package, surrounding the sustainer-motor tube at the rear of the missile, which moves the four control fins.

Like the wings, these fins are of rectangular plan-form, and the fin and wing cruciforms are indexed in line. In order to eliminate the need for boost-motor stabilizing fins (and thus reduce the bulk of the boosted round to about one-quarter of that occupied by comparable land-based missiles) it was decided to mount the boost motors on the fore-body of the missile. So important is the need to minimize bulk that the nose of each of the four large boosts is completely unfaired, the front of each motor being terminated by a flat disc. Hidden by the four boosts is the ogival nose, in which presumably is housed part of the guidance system. A high-impulse solid sustainer is used, replacing an acid/methanol motor employed on the test vehicles.

Seaslug will form the primary anti-aircraft armament of the four "County-class" fleet-escort super destroyers now under construction. Each of these ships will carry a triple Seaslug launcher on the quarterdeck, fed from large internal magazines. Rounds will be stored in the boosted and fully operational condition on magazine trollies mounted on a transverse rail system. It will be possible to select individual rounds—chosen according to serviceability, type of warhead, or other variables—from a central control room. The missile chosen will then be moved sideways, lifted by a hoist off its trolley (which will return to its place) and into a longitudinal conveyor system.

The latter will take the form of a four-rail system along which the Seaslugs will be moved hydraulically by a lug engaging with a socket on one of the boost motors. At one point a transverser will permit the missiles to pass from one conveyor to the next, or into a check-out and test room. At the output end (i.e., the stern end, in the County ships) a tilting loading cradle will rotate the Seaslug into a position from which it can be slid straight up into the launcher by means of hydraulic rammers. A triple launcher will, of course, be served by three parallel conveyor systems.

Many Seaslugs have now been fired, both from shore bases and from the Royal Navy guided-weapon trials ship *Girdle Ness*. A variety of targets have been successfully engaged, and, on more than one occasion, the firing of a brace of Seaslugs has resulted in the first round hitting the target and the second missile striking the largest remaining piece of wreckage. Last week *Girdle Ness* returned to the United Kingdom after an extensive series of trials in the Mediterranean. Over 100 Seaslugs were fired, and the weapon was described as being "the best the Navy has ever had."

Seaslug: overall length, about 20ft (the boosts appear to terminate in line with the nose, and so do not affect this dimension); wing and fin span, both about 60in; body diameter, about 19in; firing weight, probably about 2,000 lb (about 4,000 lb with boosts); burn-out speed, probably over Mach 2; maximum slant range, probably more than 20 miles.

SX-A5 DEVELOPMENT

Royal Navy.

Type: Small guided weapon for surface ships.

SECURITY prevents the publication of any details of this new weapon system, which is being developed for the Royal Navy by Short Brothers and Harland, Ltd., at Queen's Island, Belfast. It has, however, been officially stated that it is intended to replace light anti-aircraft guns at present used in all classes of surface ship, implying production of thousands of rounds. In fact, the Parliamentary Secretary to the M.o.S. has written "if it is the success we are expecting, it should lead to . . . production orders extending over a number of years."

It is likely to be descended from the SX-A5, which was described and illustrated in our 1957 review. Aerodynamically following the same configuration as Malkara (p. 886), the SX-A5 is steered by a cruciform of moving wings and is propelled by a two-stage solid-propellant motor. Guidance is likely to be of the radio-command type and tracking flares have certainly been fitted to the SX-A5s so far seen. A drawing of the SX-A5 appears on p. 891.

SX-A5 Development: all data restricted.

SX-A5: length, 77.2in; span of wings and fins, 31in (the fins are indexed at 45 deg to the wings); weight and performance data restricted.

TALOS

United States Navy; for development and evaluation, the United States Army.

Type: Fully automatic anti-aircraft system for use from large surface vessels, with development continuing upon a land-based version. Drawing: p. 890.

SINCE our 1957 review the SAM-N-6 Talos, the most expensive and complicated naval weapon system in the world (excluding Polaris) has gone into operational service aboard the cruiser *Galveston*. The vehicle itself is unique among operational missiles in having an integral ramjet body. Boosted from a rail launcher by a large tandem solid motor, the missile ramjet lights up at supersonic speed as soon as the boost falls away and allows the airflow to start. At present the fuel used is kerosine.

As it descended from the Bumblebee project at Johns Hopkins University (see our 1957 review for history) Talos has fixed fins and a moving cruciform of wings. Terrier, originally a hastily conceived stop-gap for Talos, is a much smaller missile. Most Talos at present have a high-explosive warhead. These rounds are equipped for mid-course guidance by riding a pencil beam into the target area, whereupon the terminal semi-active homing system takes over, the target being illuminated by the powerful SPG-49 shipborne radar made by Sperry's Surface Armament Division. There are four semi-flush and spike aerials around the double-shock intake in the nose of the missile. The large warhead occupies one of the 6in-deep annular bays around the 18in ramjet, and is detonated by a Melpar proximity fuze.

Nuclear-warhead Talos are now also in full production and in service, a great deal of pioneer work being accomplished to make this possible. Owing to its much greater lethal radius the nuclear-Talos guidance system is devoid of the semi-active terminal phase.

Manufacture of the missile is handled at Mishawaka, Ind., by the Missile Section of Bendix Products Division, the ramjet body being constructed by McDonnell Aircraft. Joint prime contractor with Bendix is R.C.A., who have handled much of the guidance system, including the outstandingly accurate FPS-16 tracking radar. Ship systems are managed by Vitro Corporation, and include extensive magazines, auto selectors (by G.E.) for choosing the correct type of missile and feeding it to the twin-launcher (Northern Ordnance), Sperry SPW-2 surveillance radar, Mk 2 target-tracking weapon detectors and Mk 3 computers. Recently the chief of the Navy Bureau of Ordnance, Rear-Admiral F. S. Withington, complained that radar remained the weakest link in the Talos system. Aerial weight, he said, was limited to about 10 to 16 short tons, and the range to below 200 miles. Of this range he said "I'll be pleasantly surprised if we get it."

For more than two years the Army have been working on a land-based version of the system, and at one time the Air Force also wanted Talos (to protect S.A.C. airfields). Notwithstanding the excellence of the missile itself, the Talos LBS (land-based system) is likely to founder. R.C.A. and A.M.F. have worked hard to evolve a compatible arrangement of radars, magazines, launchers and computation and check-out gear, but, according to one authority, "they came up with automatic precision equipment that would do justice to a modern oil refinery." Sophisticated and automatic shipboard systems do not seem at home in jungle and desert. Nevertheless the LBS did achieve a superb strike on a Mach 2 Kingfisher target last August.

Development of LBS is continuing, and the Navy are also evolving a super-Talos, which will have fully modular electronics, improved guidance, a larger boost of increased specific impulse and greater internal tankage. The range is expected to start at 80 miles and work up to 100. The Bureau of Ordnance is continuing studies against land and sea targets, and an advanced project exists for an anti-missile Talos, possibly with twin engines and flying at over Mach 5.

SAM-N-6 Talos: overall length, approximately 21ft (31ft with booster); body diameter, 30in (containing an 18in integral ramjet); wing span, 102in; firing weight, approximately 3,300 lb (about 6,500 lb with booster); cruise speed, about Mach 2.7; maximum slant range, currently about 50 miles.